

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2301

Roll No.

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B.Tech.

(SEM. I) ODD SEMESTER THEORY

EXAMINATION 2012-13

ELECTRICAL ENGINEERING

Time : 3 Hours

Total Marks : 100

Note :- Attempt **all** Sections. Assume missing data, if any.

SECTION-A

1. Answer **all** parts of this section : **(2×10=20)**
- (i) On what factors do the resistance of a conductor depends ?
 - (ii) Calculate the form factor of a square wave.
 - (iii) What is the use of condenser in single-phase AC motor ?
 - (iv) The dimension of L/CR is
 - (v) The maximum and minimum value of power factor can be
 - (vi) Write the name of different types of rotor of an alternator.
 - (vii) What is typical use of an autotransformer ?
 - (viii) What happens if DC supply is given to a transformer ?
 - (ix) Under no load running condition of synchronous machine, what will be the angle between the induced voltage and supply voltage ?
 - (x) Enlist the types of moving iron instrument.

SECTION-B

2. Answer any **three** parts of this Section : (10×3=30)

- (a) Using superposition theorem, calculate the current in the AB branch in the circuit shown in below figure :

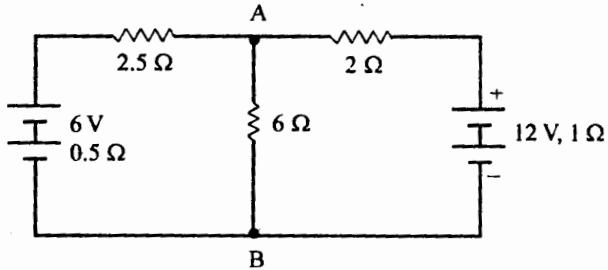


Fig.

- (b) Obtain the power factor of a two branch parallel circuit where the first branch has $\bar{Z}_1 = (2 + j4)\Omega$ and second $\bar{Z}_2 = (6 + j0)\Omega$. To what value must the 6Ω resistor be changed to result in the overall power factor 0.9 lagging ?
- (c) A moving coil instrument having a resistance of 50Ω has a full-scale deflection of 1 mA. Calculate :
- (i) Shunt resistance to convert the instrument into an ammeter of 2 A range.
 - (ii) Net resistance of the meter.
- (d) Prove that for a single-phase transformer :

$$(\text{KVA})_{\text{at max}} = (\text{KVA})_{\text{rated}} \sqrt{\frac{P_{\text{core}}}{P_{\text{ohmic (rated)}}}}$$

- (e) A DC shunt motor runs at 600 rpm taking 60 A from a 230 V supply. Armature resistance is 0.2 ohm and field resistance is 115 ohms. Find the speed when the current through the armature is 30 A.

SECTION-C

Note :- Answer any **five** questions of the following : (10×5=50)

3. Why power factor measurement is important ? What are causes and problems of low power factor ? How power factor can be improved ?
4. A series RLC circuit consisting of a resistance of 20Ω , inductance 0.2 H and capacitance of $150\mu\text{f}$ is connected across a 230 V, 50 Hz source. Calculate :
 - (i) the impedance
 - (ii) the current
 - (iii) Power factor
 - (iv) the frequency of supply to be adjusted to make power factor unity.
5. Calculate current in a 1000Ω resistor connected between terminals A and B, as shown in the below figure with the help of Thevenin's theorem.

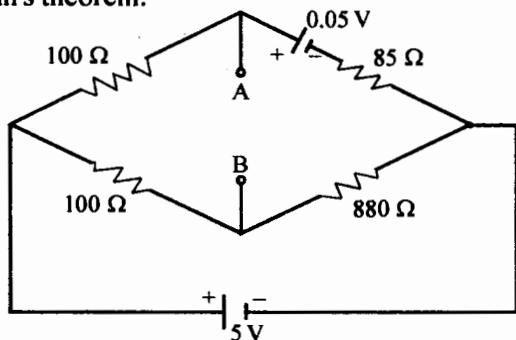


Fig.

6. Explain the speed-torque characteristics of a DC shunt and series motors.
7. What is the use of starter ? Explain various methods of starting of 3-phase induction motors.
8. Using double-revolving field theory, explain the principle of operation of a single-phase induction motor.
9. A balanced 3-phase star-connected load of 18 kW taking a leading current of 60 amperes when connected across a 3-phase 440 V, 50 Hz supply. Find the values and nature of load.